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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/895,153	07/02/2001	Koon Gee Neoh	1781-0233P	9536
2292	7590	10/07/2003	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			TSOY, ELENA	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 10/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/895,153

Applicant(s)

NEOH ET AL.

Examiner

Elena Tsoy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 34-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 34-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 93003.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 19, 2003 has been entered.

***Response to Amendment***

1. Amendment filed on August 19, 2003 has been entered. Claims 23-33 have been cancelled. Claims 1-19, 34-36 are pending in the application.

***Claim Objections***

2. Objection to claims 35, 36 to because of the informalities has been withdrawn.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Rejection of claims 1-19, 23, 34, 35 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been withdrawn because applicants' arguments are found to be persuasive.

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For examining purposes the Examiner interpreted "a pre-doped composition" of claim 1 according to prior art as a composition having up to 50 % of viologen salt.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 2, 10, 11, 17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mikhael et al (US 6,040,017) in view Porter (US 4,211,621).

As to claims 1, 2, 17, Mikhael et al disclose a method for preparing an electrically conductive polymeric material (See column 2, lines 66-67), comprising i) contacting a polymeric material such as polyaniline (See column 3, lines 47-48) with an organic electron-acceptor dopant such as quinone (See column 3, lines 45-47) to form a pre-doped composition (See column 2, lines 9-30); and ii) irradiating the pre-doped composition with UV light (electromagnetic radiation of an appropriate wavelength) (See column 2, lines 38-39) thus producing electrically conductive polymeric material (See column 2, lines 66-67). The dopant may be **any** electrophilic *organic substance* that **interacts or complexes** with **any** electron-rich *organic donor material* (See column 3, lines 19-23). The electron-acceptor dopant is e.g., C60 fullerene, tetracyanoethylene, or tetrafluoromethanecyanoquinodimethane (quinone), the electron-donor substance is e.g., vinylcarbazole, 9,10-bis(phenylethynyl) anthracene, sudan azo dyes, or polyaniline (See column 3, lines 44-48).

Mikhael et al fail to teach that an organic electron-acceptor is a viologen salt (Claim 1), wherein at least one of the 1,1'-substituents are independently selected from an alkyl group or a benzyl group (Claim 11), or a mixture of viologen salts (Claim 10).

Porter teaches that quinone and a viologen such as methyl viologen and benzyl viologen (See column 7, lines 39-47) are powerful oxidizing agents, which may be used for abstracting electrons from excited manganese (organic) complex (See column 4, lines 64-69), i.e. quinone and viologen are *organic substances* that are capable of **interacting** with organic electron donating material. Clearly, quinone and viologen would be capable of extracting electrons from (i.e., **interacting with**) **electron-rich** organic donor material. Therefore, since methyl viologen and benzyl viologen are capable of **interacting** with organic electron donating material, they would be capable of abstracting electrons from (*interacting with*) **electron-rich** organic **donor** material. In other words, Porter is relied upon to show that methyl viologen and benzyl viologen are capable of **interacting** with organic electron donating material (which clearly include **electron-rich** organic **donor** material), and also to show that methyl viologen and benzyl viologen are functionally equivalent to quinone in interacting with organic electron donor material especially with **electron-rich** organic **donor** material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used methyl viologen or benzyl viologen instead of quinone electron-acceptor in Mikhael et al since Porter teaches that methyl viologen and benzyl viologen are functionally equivalent to quinone in interacting with organic electron donor material; and the selection of any of these known materials as an electron-acceptor in Mikhael et al would be within the level of ordinary skill in the art.

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One of ordinary skill in the art at would have reasonable expectation of success in using methyl viologen or benzyl viologen as an electron-acceptor in Mikhael et al instead of quinone because Mikhael et al teach that **any organic substance** that **interact** with electron-rich organic **donor** material can be used as an electron-acceptor, and Porter shows that methyl viologen and benzyl viologen are capable of **interacting** with organic electron donating material, which clearly include **electron-rich organic donor** material.

7. **Claims 1, 2, 7-11, 15, 17-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Porter (US 4,211,621) and Rembaum (US 3,754,055).

As to claims 1, 8, 17, Afzali-Ardakani et al disclose a method for preparing an electrically conductive polymeric material (article) (See column 1, lines 8-16; column 2, lines 31-43), comprising contacting a polymeric material such as polyaniline with an organic electron acceptor (See column 4, lines 26-33) such as quinone (See column 3, lines 61-67) by depositing the organic electron acceptor on a polyaniline film to form a pre-doped charge transfer complex (CTC) of polyaniline with the electron acceptor (See column 1, lines 52-58; column 4, lines 44-52). The polyaniline film (polymeric material) is also deposited on a substrate (See column 4, lines 26-33).

Afzali-Ardakani et al fail to teach that an organic electron-acceptor is a viologen salt (Claims 1, 9) such as dihalide (Claim 15) or a mixture of viologen salts (Claim 10), wherein the 1,1'-substituents are independently selected from an alkyl group or a benzyl group (Claim 11).

Porter is applied here for the same reasons as above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a viologen salt such as methyl viologen or benzyl viologen instead of quinone electron-acceptor in Mikhael et al since Porter teaches that methyl viologen and benzyl viologen

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are functionally equivalent to quinone for their use as an electron-acceptor with electron-rich organic material; and the selection of any of these known materials as an electron-acceptor in Afzali-Ardakani et al would be within the level of ordinary skill in the art.

Afzali-Ardakani et al in view of Porter fail to teach that the viologen salt is attached by grafting onto the polyaniline film utilizing electromagnetic radiation (Claim 1) such as UV radiation (Claim 2) at a temperature 0-80°C in the presence of air and in the absence of any solvent (Claim 19).

Rembaum teaches that grafting a quarternized *pyridine* onto a substrate can be easily performed by first quarternizing vinyl pyridine via reaction with alkyl halide, then grafting resulting quarternized vinyl *pyridine* onto the substrate utilizing gamma radiation at a temperature 0-80°C in the presence of air and in the absence of any solvent (See column 2, lines 10-17, 62-69; column 3, lines 1-50). It is well known in the art that gamma radiation is functionally equivalent to UV, plasma, etc. for grafting vinyl containing components onto substrates since grafting is normally initiated by the presence of peroxides or peroxy radicals that have been generated on the polymer surface via plasma, UV, or gamma-ray exposure with the monomer applied in a *gas* or liquid phase, as evidenced by Spence (US 6,083,355, column 24, lines 6-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used UV radiation instead of gamma radiation in Rembaum for grafting quarternized vinyl pyridine vinyl onto a substrate since it is well known in the art that gamma radiation is functionally equivalent to UV, plasma.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have attached a viologen salt onto a polyaniline film of Afzali-Ardakani et al in view of Porter utilizing a vinyl containing viologen salt and UV radiation at a temperature 0-80°C in the

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presence of air and in the absence of any solvent since Rembaum teaches that grafting a quarternized *pyridine* onto a substrate can be easily performed by first quarternizing vinyl pyridine via reaction with alkyl halide, then grafting resulting quarternized vinyl *pyridine* onto the substrate utilizing gamma radiation at a temperature 0-80<sup>0</sup>C in the presence of air and in the absence of any solvent.

As to claim 7, Afzali-Ardakani et al further teach that a complexation of polyaniline with an electron acceptor can be prepared by *mixing* a polyaniline solution with a solution of the electron acceptor (See column 4, lines 37-41) so that polyaniline is contacted with the electron acceptor before forming a coating or a film.

As to claim 18, the polymeric material of Afzali-Ardakani et al in view of Porter would have reduced resistance by approximately 3-6 orders of magnitude within a period of 3 hours or less since it is held that products having identical or substantially identical structure or composition, would have identical or substantially identical properties.

8. **Claims 3-6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Porter (US 4,211,621) and Rembaum (US 3,754,055), as applied above, further in view of Beratan et al (US 5,016,063).

Afzali-Ardakani et al in view of Porter in view of Rembaum, as applied above, fail to teach that the viologen salt is deposited on a suitable substrate (Claims 3-5) so that polyaniline is coated on the viologen salt deposited on the substrate (Claim 6).

Beratan et al teach that for some applications a charge transfer complex (CTC) comprising polyaniline electron donor and a viologen salt electron acceptor can be positioned between two substrates wherein the complex is attached to a first substrate via the viologen salt and to a second substrate via polyaniline and preferably the viologen salt electron acceptor is connected to the



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polyaniline electron donor via an intermediate donor for an improved charge transfer (See Fig. 4b; column 6, lines 16-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have positioned a charge transfer complex of Afzali-Ardakani et al in view of Porter in view of Rembaum by attaching (depositing) a viologen salt onto a suitable substrate so that polyaniline is attached to the viologen salt depending on intended use of a final product since Beratan et al teach that for some applications a charge transfer complex (CTC) comprising polyaniline electron donor and a viologen salt electron acceptor can be positioned between two substrates wherein the complex is attached to a first substrate via the viologen salt and to a second substrate via polyaniline.

9. **Claims 12-14, 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view Porter (US 4,211,621) and Rembaum (US 3,754,055), as applied above, and further in view of Inata et al (US 5,068,062).

Combination of Afzali-Ardakani et al, Porter and Rembaum, as applied above, fails to teach that viologen salt is a polymeric viologen salt (Claim 12) wherein the viologen moiety is present in the backbone of the polymeric viologen salt (Claim 13) such as viologen dihalide (Claim 16) or as a side chain of the polymeric viologen salt (Claim 14).

Inata et al teach that it is well known in the art that a polymeric viologen salt such as viologen dihalide (See column 1, lines 44-59) is more industrially applicable because it has longer repetition life (See column 1, lines 18-28) having the viologen moiety either in the backbone of the polymeric viologen salt (See column 2, lines 1-13) or as a side chain of the polymeric viologen salt (See column 1, lines 42-62).

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a polymeric viologen salt having the viologen moiety either in the backbone of the polymeric viologen salt or as a side chain of the polymeric viologen salt as an viologen acceptor in combination of Afzali-Ardakani et al and Porter with the expectation of providing the desired long repetition life, as taught by Inata et al.

10. **Claim 34** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370), Porter (US 4,211,621) and Rembaum (US 3,754,055), as applied above, further in view of Allemand et al (US 5,729,379).

Combination of Afzali-Ardakani et al, Porter and Rembaum, as applied above, teaches that polyaniline can be deposited on (any) substrate (See Afzali-Ardakani et al, column 4, lines 27-28). However, the combination fails to teach that the substrate is of low density polyethylene (LDPE).

It is well known in the art that LDPE is suitable to use with CTCs for various purposes, as evidenced by Moshtev et al (US 4,234,623, column 2, lines 38-39) and Spence (US 6,083,355, column 6, lines 33, 43-44).

It is held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used LDPE as a substrate in combination of Afzali-Ardakani et al, Porter and Rembaum depending of intended use of the final product since it is well known in the art that

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LDPE is suitable to use with CTCs for various purposes, as evidenced by Moshtev et al and Spence.

Combination of Afzali-Ardakani et al, Porter and Rembaum also fails to teach that: (i) polyaniline is formed on the substrate in situ by immersing the LDPE substrate into the solution of aniline and ammonium sulfate to form a polyaniline coated substrate; (ii) irradiating the coated substrate with UV in the presence of vinyl alkyl halide or vinyl benzyl halide to form a vinyl alkyl halide or vinyl benzyl halide substrate; and (iii) forming a viologen salt on the vinyl alkyl halide or vinyl benzyl halide grafted substrate via a reaction with 4,4' bipyridine and alkyl halide.

As to (i), Allemand et al teach that polyaniline can be formed on a substrate in situ by immersing the substrate into the solution of aniline and ammonium sulfate (See column 13, lines 1-5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a coating of polyaniline in situ on a substrate of combination of Afzali-Ardakani et al, Porter and Rembaum using a method well known in the art comprising immersing a substrate into a solution of aniline and ammonium sulfate with the expectation of providing the desired polyaniline coated substrate, as taught by Allemand et al.

As to steps (ii), (iii), the Examiner takes a position that the recited steps (i)-(iii) represent well known conventional methods of organic synthesis, i.e., grafting chloromethyl functional groups on a suitable polymeric substrate using vinyl alkyl (benzyl) chloride utilizing radiation or plasma is well known and conventionally used in the art, as well as reacting the chloromethyl functional groups with tertiary nitrogen containing compound such as pyridine to produce a grafted quarternized pyridine on the polymeric substrate, and quarternizing a grafted tertiary nitrogen containing compound by reacting with alkyl halide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed polyaniline/viologen salt CTC using claimed steps (i)-(iii) for depositing polyaniline in situ on a suitable substrate including claimed LDPE followed by attaching the viologen salt on the deposited polyaniline viologen salt bearing substrate using claimed steps since claimed steps (i)-(iii) represent well known conventional methods of organic synthesis.

11. **Claim 35** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Porter (US 4,211,621), Rembaum (US 3,754,055) and Beratan et al (US 5,016,063), and further in view of Moshtev et al (US 4,234,623).

Afzali-Ardakani et al further teaches that polyaniline can be deposited on (any) substrate (See column 4, lines 27-28). However, Afzali-Ardakani et al/in view Porter, Rembaum and Beratan et al fail to teach that the substrate is of low density polyethylene (LDPE).

Moshtev et al teach that LDPE is suitable to use with CTCs for various purposes (See column 2, lines 38-39).

It is held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960) (selection of a known plastic to make a container of a type made of plastics prior to the invention was held to be obvious); *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used LDPE as a substrate in combination of Afzali-Ardakani et al, Porter, Rembaum and Beratan et al depending of intended use of the final product since Moshtev et al teach that LDPE is suitable to use with CTCs for various purposes.

Combination of Afzali-Ardakani et al, Porter, Rembaum and Beratan et al also fails to teach that viologen salt bearing substrate is formed by providing vinyl alkyl halide grafted substrate; and forming a viologen salt on the vinyl alkyl halide or vinyl benzyl halide grafted substrate via a reaction with 4,4' bipyridine and subsequently with alkyl halide.

The Examiner takes a position that the recited steps represent well known conventional methods of organic synthesis, i.e., grafting chloromethyl functional groups on a suitable polymeric substrate using vinyl alkyl (benzyl) chloride utilizing radiation or plasma is well known and conventionally used in the art, as well as reacting the chloromethyl functional groups with tertiary nitrogen containing compound such as pyridine to produce a grafted quarternized pyridine on the polymeric substrate, and quarternizing a grafted tertiary nitrogen containing compound by reacting with alkyl halide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed viologen salt bearing substrate using claimed steps since claimed steps represent well known conventional methods of organic synthesis.

12. **Claim 36** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afzali-Ardakani et al (US 5,776,370) in view of Porter (US 4,211,621), Rembaum (US 3,754,055) and Beratan et al (US 5,016,063), as applied above, and further in view of Pohl et al (US 4,455,233).

Combination of Afzali-Ardakani et al, Porter, Rembaum and Beratan et al fails to teach that the viologen salt is deposited on a suitable substrate by (i) grafting vinyl benzyl chloride groups on a substrate using vinyl benzyl chloride, and (ii) reacting the vinyl benzyl chloride groups an equimolar mixture of 4,4' bipyridine and p-xylene dihalide.

As to (i), Pohl et al teach that pendant vinyl benzyl chloride groups can be easily grafted onto a substrate by irradiation the substrate in a solution of vinyl benzyl chloride (See column 8, lines 5-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have grafted vinyl benzyl chloride groups in combination of Afzali-Ardakani et al Porter and Beratan et al by using substrate other than phenyl-containing substrate by irradiation the substrate in a solution of vinyl benzyl chloride since Pohl et al teach that pendant vinyl benzyl chloride groups can be easily grafted onto a substrate other than phenyl-containing substrate by irradiation the substrate in a solution of vinyl benzyl chloride.

As to (ii), Rembaum, as applied above, further teaches that pyridine reacts with aralkylene dihalide by simple mixing (See column 2, lines 10-17). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an equimolar mixture of 4,4' bipyridine and aralkyl dihalide instead of forming a dipyridyl mono aralkyl halide compound in combination of Afzali-Ardakani et al Porter, Rembaum and Beratan et al with the expectation of providing the desired viologen salt-grafted substrate since Rembaum teaches that pyridine reacts with aralkylene dihalide by simple mixing.

13. The prior art made of record and not relied upon is considered pertinent to applicant disclosure.

Rembaum (US 3,754,055), Spence (US 6,083,355) and McRae (US 5,141,717) teach that chloromethyl functional groups can be grafted on a suitable polymeric substrate using vinyl alkyl (benzyl) chloride utilizing radiation or plasma (See Rembaum, column 3, lines 41-44), (See Spence, column 24, lines 6-13), (See McRae, column 8, lines 1-10).

Jones (US 4,112,207) teaches that quarternized pyridine can be grafted on the polymeric substrate having chloromethyl functional groups by reacting the chloromethyl functional groups with tertiary nitrogen containing compound such as pyridine (See column 8, lines 54-55).

Katsurada et al teach that a grafted tertiary nitrogen containing compound can be quarternized by reacting with alkyl halide (See column 7, lines 62-67, column 8, lines 1-2).

### ***Response to Arguments***

14. Applicants' arguments filed March 20, 2003 have been fully considered but they are not persuasive.

A) Applicants argue that a secondary reference of Porter cannot remedy Mikhael et al because there is no limitation on the polymer to be made conductive upon oxidative doping, that it is an electron rich material and (2) there is no "excited manganese complex" involved; and Porter describes oxidative splitting of water to make hydrogen and oxygen using a porphyrin-manganese complex imitative of the reaction center of chlorophyll so that they cannot both be used to oxidize a polymer substrate. Thus, Porter does not establish equivalence of quinones and viologen salts for purposes of the present invention since Porter shows equivalency of quinones and viologen salts only for purpose of oxidative splitting of water to form hydrogen but not for polymeric materials.

The Examiner respectfully disagrees with this argument. As was discussed above, Porter teaches that quinone and a viologen such as methyl viologen and benzyl viologen (See column 7, lines 39-47) are powerful oxidizing agents, which may be used for abstracting electrons from excited manganese (organic) complex (See column 4, lines 64-69), i.e. quinone and viologen are *organic substances* that are capable of **interacting** with organic electron donating material. Clearly, quinone and viologen would be capable of extracting electrons from (i.e., **interacting** with) **electron-rich** organic donor material. Therefore, since methyl viologen and benzyl viologen

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are capable of **interacting** with organic electron donating material, they would be capable of abstracting electrons from (*interacting with*) **electron-rich** organic **donor** material. In other words, Porter is relied upon to show that methyl viologen and benzyl viologen are capable of **interacting** with organic electron donating material (which clearly include **electron-rich** organic **donor** material), and also to show that methyl viologen and benzyl viologen are functionally equivalent to quinone in interacting with organic electron donor material especially with **electron-rich** organic **donor** material.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used methyl viologen or benzyl viologen instead of quinone electron-acceptor in Mikhael et al since Porter teaches that methyl viologen and benzyl viologen are functionally equivalent to quinone in interacting with organic electron donor material; and the selection of any of these known materials as an electron-acceptor in Mikhael et al would be within the level of ordinary skill in the art.

One of ordinary skill in the art at would have reasonable expectation of success in using methyl viologen or benzyl viologen as an electron-acceptor in Mikhael et al instead of quinone because Mikhael et al teach that **any organic substance** that **interact** with electron-rich organic **donor** material can be used as an electron-acceptor, and Porter shows that methyl viologen and benzyl viologen are capable of **interacting** with organic electron donating material, which clearly include **electron-rich** organic **donor** material.

(B) Applicants argue that claimed invention provides unexpected results compared to the cited prior art.



However, this statement is not supported by any evidence: there are no experimental data showing unexpected results of using viologen dopants compared to other electron acceptors, e.g. quinones.

(C) Applicants argue that Pohl is misplaced because gamma radiation is used by Pohl for grafting while claimed invention uses radiation for oxidation of viologen salt.

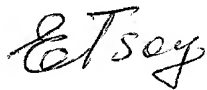
Applicants misunderstood Pohl. Gamma radiation in Pohl relates to step a) of claim 36 not to step d).

*Conclusion*

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is (703) 605-1171. The examiner can normally be reached on Mo-Thur. 9:00-7:30, Mo-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for all communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Elena Tsoy  
Examiner  
Art Unit 1762

October 1, 2003